A-G Courses Manager

Integrated Math 1 - CPM

Alameda City Unified School District

⚠ Forwarded awaiting submission

asic Course Information

hool(s) Offering This Course:

School Name	Course Learning Environment	Transcript Code(s)	Local Course Code(s)
lameda High School (050005)	Classroom Based	Int Math 1	
ncinal High School (050015)	Classroom Based	Int Math 1	
lameda Science and Technology Institute 050029)	Classroom Based	Int Math 1	

Title: Integrated Math 1 - CPM

Length of course: Full Year

Subject area: Mathematics (C) / Mathematics I

UC honors designation? No

Prerequisites: None

Co-requisites: None

Integrated (Academics / CTE)? No

Grade levels: 9th

ourse Description

urse overview:

SUMMARY:

This full-year California Common Core standards-based course will cover the state prescribed curriculum for Mathematics 1(Integrated Pathway). This course emphasizes formal development of the skills and concepts from the conceptual categories of Number and Quantity, Algebra, Functions, Geometry and Statistics and Probability. It aims to deepen and extend student understanding built in previous courses by focusing on developing fluency with solving linear equations, inequalities, and systems. These skills are extended to solving simple exponential equations, exploring linear and exponential functions graphically, numerically, symbolically, and as sequences, and by using regression techniques to analyze the fit of models to distributions of data.

Students will use problem-solving strategies, questioning, investigating, analyzing critically, gathering and constructing evidence, and communicating rigorous arguments justifying their thinking. Under teacher guidance, students learn in collaboration with others while sharing information, expertise, and ideas.

The course is balanced among procedural fluency (algorithms and basic skills), conceptual understanding, strategic competence (problem solving), and adaptive reasoning (extension and application).

The lessons in the course meet all of the content standards, of Appendix A of the *Common Core State Standards for Mathematics*. The course embeds the CCSS Standards for Mathematical Practice as an integral part of the lessons in the course.

Key concepts addressed in this course are:

- Representations of linear and exponential relationships using graphs, tables, equations, and contexts.
- Symbolic manipulation of expressions in order to solve problems, such as factoring, distributing, multiplying polynomials, expanding exponential expressions, etc.
- Analysis of the slope of a line multiple ways, including graphically, numerically, contextually (as a rate of change), and algebraically.
- Solving equations and inequalities using a variety of strategies, including rewriting (such as factoring, distributing, or completing the square), undoing (such as extracting the square root or subtracting a term from both sides of an equation), and looking inside (such as determining the possible values of the argument of an absolute value expression).
- Solving systems of two equations and inequalities with two variables using a variety of strategies, both graphically and algebraically.
- Use of rigid transformations (reflection, rotation, translation) and symmetry to demonstrate congruence and develop triangle congruence theorems.
- Using coordinates to prove geometric theorems.

- Geometric constructions (with compass and straightedge).
- Simple geometric proofs (investigate patterns to make conjectures, and formally prove them).
- Representations of arithmetic and geometric sequences, including using tables, graphs, and explicit or recursive formulas.
- Use of exponential models to solve problems, and to compare to linear models.
- Use of function notation.
- Statistical analysis of two-variable data, including determining regression lines, correlation coefficients, and creating residual plots.
- The differences between association and causation, and interpretation of correlation in context.
- Comparison of distributions of one-variable data.

CLASSWORK:

A variety of instructional strategies will be used within each unit. The students will be given investigation activities to explore new material and make their own predictions. There will be a combination of direction instruction, modeling, guided practice, whole class and small group discussion, collaborative activities and independent work. The majority of each day will involve students working on a task collaboratively with other students. Study team strategies suggested in the CPM curriculum will be used. Instructional methods will support one or more of the Standards for Mathematical Practice.

Class work is designed to have students working cooperatively or individually every day. The lessons involve opportunities for students to make sense of problems and persevere in solving them, reason abstractly and quantitatively, construct viable arguments and critique the reasoning of others, model with mathematics, use appropriate tools strategically, attend to precision, look for and make use of structure, and look for and express regularity in repeated reasoning. Students will share their mathematical thinking, and develop their ability to think critically and problem solve. Students will daily use at least one of the eight Standards of Mathematical Practice.

There will be various assessments, including 1 - 3 small formative assessments, a team practice test and a cummulative summative individual assessment each unit. There will be a cumulative comprehensive final exam at the end of each semester.

›urse content:

Unit 1: Functions

In this unit students investigate growth patterns and characteristics of graphs of non-linear functions. The unit focuses on describing both linear and non-linear functions. Students will also work on rewriting expressions involving exponents in more useful forms.

Students will learn to:

- **Consider inputs and outputs for various composite functions.**
- **Collect and analyze data in tables and graphs.**
- **Build multiple representations of functions.**
- **Describe functions using function notation, domain, and range.**
- **Determine what makes a relation and a function.**

- Rewrite expressions with exponents in equivalent forms.
- Formalize laws of exponents.

Unit Assignment(s):

Example activity: Data Labs

Students will work in teams to investigate growth patterns encountered in real world situations. Students present their findings in oral and written presentations highlighting function characteristics: increasing/decreasing, lines of symmetry, intercepts and the meaning of the intercepts, relative max and min points, end behavior.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

Unit 2: Linear Functions

In this unit students will investigate geometric tile patterns and make connections between the growth in the pattern to slope on a graph. Students will explore differences in slope and how different slopes appear on a graph. Students will also investigate slope as a rate of change. Students will also represent linear functions in multiple ways and learn to move back and forth between representations.

Students will learn to:

- Write linear equations for patterns.
- Calculate slope of linear functions.
- Compare slope values and their effect on graphs.
- Form equations of lines in y=mx+b.
- Calulate slope between two points.
- Connect slope and rate and understand slope and y-intercept in context.
- Convert between units of rate.
- Find the y-intercept given slope and a point.
- Write equations of lines between two points.

Unit Assignment(s):

Example activity: The Big Race

Students will work in teams to understand the meaning of the rate of change in a variety of situations. They will be given clues about different racers and then work with their team to graph data for three people participating in a race, then write an equation from each. Based on the graphs and equation, students will explore aspects of the race including: when racers catch up or pass each other; how long it takes each racer to finish; and what is the speed of each racer.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

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Unit 3: Solving and Transformations

In this unit students will learn about rigid transformations and how to use them to build new shapes and describe symmetry. Students will learn to rewrite products of polynomials using area models. Students will also gain new methods for solving different types of equations.

Students will learn to:

- Understand translations, reflections and rotations.
- Understand that slopes of perpendicular lines are opposites and reciprocals.
- Find connections between reflection symmetry and relationships in polygons.
- Build new shapes using transformations.
- Use area models to multiply polynomials and to verify distributive property.
- Use multiple ways to solve equations.
- Rewrite equivalent equations.

Unit Assignment(s):

Example activity:

Students work in teams to use what they have learned about rigid transformations to take half-squares, equilateral triangles, and obtuse triangles to build new polygons and describe the rotational and reflectional symmetry of those polygons. The new polygons include rhombuses, squares, parallelograms, isosceles triangles and trapezoids, right triangles, kites, and darts.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

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Unit 4: Modeling Two-Variable Data

In this unit students will learn about lines of best fit and use them to make predictions. Students will describe the association in a dependent relationship. They will use scatterplots of data to create lines and curves that model the data, and then use those models to make predictions. They will use mathematical language to describe the form, direction,

strength, and outliers of an association. Students will create residuals and learn about upper and lower bounds and use technology to create least squares regression lines. Students will also be creating residuals and analyzing them to determine if models are an appropriate fit for data.

Students will learn to:

- Write equations for lines of best fit and interpret the slope and y-intercept in context.
- Calculate, interpret, and graphically represent a residual.
- Graphically determine upper and lower bounds.
- Use calculators to find least squares regression lines.
- Solve systems of equations using multiple methods.

Unit Assignment(s):

Example activity: Students will collect data that is scattered due to the natural measurement variability. They will graph the data, approximate a line of best fit, write the equation for the line, and interpret the slope and y-intercept in the context of the problem. Students will describe the limits of the models they develop, particularly at the end regions

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

Unit 5: Sequences

In this unit students will use graphs, tables and equations to represent growth in various contexts. Students will also investigate and create multiple representations for both arithmetic and geometric sequences. Finally students will compare sequences and functions.

Students will learn to:

- Recognize, describe and represent exponential growth in multiple ways.
- Generate and model data using tables, graphs, and equations.
- Identify arithmetic and geometric sequences.
- Represent and describe arithmetic sequences using correction notation and vocabulary.
- Write sequences from recursive equations and write recursive equations for arithmetic sequences.
- Compare growth in linear and exponential tables.
- Find equations for geometric sequences and see connections to exponential functions
- Use geometric sequences to solve problems involving percent increase and decrease.
- Recognize that all sequences are functions with domains limited to non-negative integers.
- Solve exponential equations graphically.

Unit Assignment(s):

Example activity: My Phone Store Sweeps the Nation

Students work in teams to determine an exponential model for how many phones a store expects to sell. They will use a table, a graph, and explicit and recursive equations to represent the situation. The parameters will be altered to increase and decrease expected sales and students will need to calculate and explain how sales will change.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

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Unit 6: Systems of Equations

In this unit students will learn three algebraic methods to solve systems of equations written in different forms, and develop a better understanding of what a solution is by investigating real world situations. Students will learn how infinite and no solution are represented in tables, graphs, and situations. Students will develop strategies to choose the most efficient method to solve a system.

Students will learn to:

- Solve multi-variable equations.
- Solve word problems using different representations.
- Solve word problems by writing equations.
- Solve systems of equations using the substitution method.
- Solve systems of equations using the Elimination method.
- Solve systems of equations by graphing and interpret solution in context.
- Choose a strategy for solving systems.

Unit Assignment(s):

Example activity: The hills are alive

Students working in teams will use mutliple representations to decide how many yodelers and how many xylophoners can ride a gondola to the top of a mountain based on how many people can fit in the gondola and the cost of the ride. Each aspect will be investigated independently before being solved simultaneously. Students will write equations and produce tables and graphs of the situation.

Assignments for thi unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

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Unit 7: Congruence and Coordinate Geometry

In this unit students will review what they know about transformations and triangle similarity, and develop strategies for proving triangle congruence without first proving similarity. Students will explore quadrilaterals and coordinate geometry, and prove congruence via rigid transformations, reflections, rotations, and translations.

Students will learn to:

- Define congruence and conditions for triangle congruence.
- Create flowcharts to justify triangle congruence.
- Prove congruence through rigid transformations.
- Investigate and identify quadrilaterals on a coordinate grid.
- Understand coordinate geometry and finding midpoints.

Unit Assignment(s):

Example activity:

Students will develop strategies to justify that two triangles are congruent. They will discover what combinations of sides and angles are sufficient to make triangles congruent and what combinations are not sufficient And, they will use flowcharts to justify their conclusions.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

Unit 8: Exponential Functions

In this unit students will learn to recognize exponential growth in various representations and extend their understanding of exponents and their properties. They will learn about the family of exponential functions, and build more advanced algebra skills, such as writing the equation of an exponential function that passes exactly through any pair of given points. Students will apply their knowledge of exponential functions to real-life growth and decay problems and will learn to solve systems of exponential equations.

Students will learn to:

- Find connections between multiple representations of exponential functions.
- Generalize the roles of a and b for the equation $y = a \cdot b^x$.
- Understand the relationship between simple and compound interest.
- Represent exponential decay in multiple ways.
- Write equations from graphs of exponential functions.
- Find linear functions and exponential equations of the form $y = ab^x$ given two points.

- Solve a system of exponential equations graphically.

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Unit Assignment(s):

Example activity:

Students investigate a family of exponential functions and connect representations of exponential growth when given situations, tables, graphs, or equations. Teams use exponential functions and systems of equations to explore the value of three cards to determine which would be the "best" buy.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

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Unit 9: Inequalities

In this unit students learn about linear inequalities and systems of inequalities. Students will learn to graph systems of inequalities and apply this skill in solving real-world problems. They will develop ways to represent solutions to inequalities both algebraically and graphically for situations involving one variable, two variables, and systems. Students will learn how to write mathematical constraints for situations, and learn how to solve equations and inequalities involving absolute value.

Students will learn to:

- Solve single variable linear inequalities and graph the solutions.
- Solve equations and inequalities involving absolute value.
- Graph multi-variable linear and nonlinear inequalities and systems of inequalities.
- Apply inequalities to solve problems.

Unit Assignment(s):

Example activity: UN to the rescue

Students will work in teams to explore a country's budget constraints by writing an inequality representing how many food and medicine packages it an give to the UN whan a catastrophe occurs in another part of the world. Each team will work with a different set of contraints/country, and then the class will work together to analyze the feasibility of different proposals and find a solution that meet the constraints of all of the countries.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

Unit 10: Functions and Data

In this unit, students work with two-way tables to determine association of categorical data. They review the ways to graphically show data, and decide whether or not to use scatterplots or two histograms to compare two variables. They use descriptive statistics to compare two sets of data with the center, shape, spread, and outliers. Then they learn how to describe the variability (the spread) in data with standard deviation.

In this unit students learn about transforming linear and exponential functions, learn to compare distributions, and develop a new way to describe distributions.

Students will learn to:

- Transform linear and exponential functions by multiplying by a constant.
- Compare data representations using the center, shape, spread, and outliers.
- Describe data sets using standard deviation.

Unit Assignment(s):

Example activity: Golf tournament

Students work in teams to simulate a golf tournament, collect and represent data, choosing among different graphical presentations, and preparing a poster to present their team's data. Students analyze the strengths and weaknesses of the different graphical representations. Students will compare the center, shape, spread, and outliers of different distributions and will use the data collected to calculate and interpret standard deviation.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

Unit 11: Constructions and Closure

In this unit students will be introduced to basic geometric constructions through exploration. Students will also combine and apply the skills that they have learned throughout the course to larger problems.

Students will learn to:

- Construct familiar geometric shapes (such as a rhombus or a regular hexagon) using construction tools such as tracing paper, a compass and straightedge, or a dynamic geometry tool.

Unit Assignment(s):

Example actictivity: Cinco De Mayo Parade

Students work in teams to write and solve exponential functions and systems of inequalities to help them solve problems in planning a big parade. This activity incorporates learning from multiple units throughout the course.

Assignments for this unit include:

- Daily Classwork includes collaborative problem-based investigations, graphic organizers, and completion of learning journals with "math notes" to clarify main concepts in the lesson.
- Homework includes review and preview problems to provide regular spiral review.
- Formative, team, and, summative assessments throughout the unit

ourse Materials

Textbooks

itle	Author	Publisher	Edition	Website	Primar
ore Connections ntegrated 1	Leslie Dietiker, Evra Baldinger, Michael Kassarjian	College Preparatory Mathematics	2	http://www.cpm.org/	Yes

dditional Information

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